

X-RAY FLUORESCENCE (XRF) DEVICE REGULATORY GUIDE

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A. INTRODUCTION

X-Ray Fluorescence (XRF) devices use a small amount of radioactive material, usually 10-50 millicuries of either Cobalt-57 or Cadmium-109, to detect and quantify the amount of metals (particularly lead) in paint or soil.

Since they became commercially available in the early 1970's, XRF devices have become increasingly popular for providing a faster, cheaper and non-destructive alternative to laboratory analysis of samples suspected to contain high concentrations of lead.

The Virginia Department of Health's Radiological Health Program (RHP) has prepared this guide to assist potential users of XRF devices in meeting their regulatory responsibilities to insure that the devices are properly licensed and safely operated within the Commonwealth of Virginia. You must apply for and maintain a Virginia license even if you plan to only rent XRF devices and never intend to purchase one.

The Commonwealth of Virginia's Radiation Protection Regulations (VRPR) which were last issued in 1988, cover the regulation of radioactive sources within the Commonwealth. Virginia is not an agreement state with the Nuclear Regulatory Commission (NRC) and only regulates naturally occurring or accelerator-produced radioactive materials (NARM). The NRC is responsible for regulating byproduct, source or special nuclear material.

Because the XRF device, its usage and users are markedly different from most licensees regulated by RHP, several regulations are exempted or interpreted differently for these devices and their operators. These differences will be highlighted in this guide and will eventually be incorporated into a separate section dealing specifically with XRF devices in future revisions of the VRPR.

This Regulatory Guide discusses the radioactive materials licensing procedure, record keeping requirements and additional responsibilities that will be expected of the XRF licensee.

1. RADIOACTIVE MATERIALS LICENSE APPLICATION PROCEDURE

1.1 How to Obtain a Radioactive Materials License Application

You may only obtain a Radioactive Materials (radmat) License if you already have or plan to open an office within the borders of Virginia, where you will be expected to store the XRF device(s) and all relevant records. A Radioactive Materials (radmat) License Application may be obtained by contacting the Virginia Department of Health's Radiological Health Program, P.O. Box 2448 Room 240 Richmond, VA 23218. The telephone number is (804) 786-5932 and the Fax number is (804) 786-6979. There are currently no fees charged for any radmat licensing services, but that may change in the near future should Virginia choose to become an agreement state with the NRC.

1.2 Completing the Radioactive Material License Application for the XRF Device

1.2.1 Training of Authorized Users

All authorized users (including the designated Radiation Safety Officer if he/she intends to use the device) must be trained to properly use the XRF device. All users must attend and submit certificates of completion for the XRF manufacturer's one day training class. In special cases, we may accept classes conducted by a competitor manufacturer's course if the XRF devices are comparable and utilize the same radioactive isotope. This information should also be listed on row 11 b of the application. Any additional training and experience involving radioactive materials should be listed where appropriate in sections 11 and 12 of the application.

All XRF users who intend to test residences for the presence of lead must also be licensed by the Virginia Department of Professional & Occupational Regulation (VDPOR) as either a lead inspector/technician or an inspector/risk assessor. Contact VDPOR at (804) 367-8595 for information on how to obtain this license. **We will be unable to issue a new license or add a new user to an existing license until we receive both the 1-day training course certificate and VDPOR license for each authorized user.** If you wish your Radiation Safety Officer (RSO) to serve strictly in an administrative (non-user) capacity, please stipulate this on the application and all certification and licensing requirements will be waived for that individual. **If you only intend to use the XRF test for the presence of lead in soil, this requirement will be waived.**

1.2.2 Radiation detection devices

Radiation detection devices (e.g. survey meters) are not required for licensees who only possess radioactive sources contained within an XRF device. If any survey meters are present on site, describe them in sections 13 and 14.

1.2.3 Dosimetry

XRF operators are required to use film badge dosimeters or Thermoluminescent Dosimeters (TLDs). Direct-reading (e.g. "Pocket") dosimeters are **not** required. For section 15, be sure to list the name

and address of the company that will be providing your dosimetry services. Although the newer XRF devices are extremely well-shielded, the potential still exists for operators to be exposed to excessive levels of radiation if the device is accidentally damaged or misused.

1.2.4 Security

To prevent unauthorized contact or removal of the device, provisions should be made to keep the device in an unoccupied area behind a locked door. If that is impossible, the device should be kept in an anchored box or cabinet that is properly labeled and padlocked. For section 16, be sure to include a sketch of the floor plan of the facility showing where the XRF device is to be stored when not in use.

1.2.5 Radiation Protection Program

Section 17 refers to a Radiation Protection Program document that should be readily available to all employees. A copy should also be kept with the device at all times. On request, the XRF manufacturer should be able to provide documentation/manual(s) which include a discussion of leak testing, proper operation of the device, personal protection and emergency methods/procedures. At a minimum, these sections may be photocopied and submitted as evidence of your Radiation Protection Program. You may supplement or substitute these procedures with your own as you see fit. A copy of your Radiation Protection Program should be attached to your completed Radioactive Materials License application.

2. XRF LICENSEE RECORD KEEPING REQUIREMENTS

2.1 Registration of purchased XRF devices

Upon purchasing an XRF device, you must provide written notification of the manufacturer, model and serial number to RHP. A facsimile transmission is acceptable. If you only intend to rent XRF devices, this information is not required.

2.2 License amendments

RHP must be promptly informed, in writing, of any changes in license conditions. This would include changes in company name, address, telephone number(s), authorized user(s) and/or Radiation Safety Officer. Upon receipt of any requested changes, this office will amend the license and send written confirmation to the licensee. Failure to keep your license information up to date in a timely manner could result in forfeiture of the license.

2.3 License renewal

New XRF radioactive material licenses must be renewed every two years. Licenses issued prior to this date will be subject to the 2-year renewal period after the current license expires. You will receive a reminder notification from this office approximately one month before your license expires. It will be your responsibility to send written notification of your wish to renew the license

before the expiration date is reached.

2.4 Utilization Log

XRF licensees are expected to track the whereabouts of their XRF device(s) on a utilization log(s), which should be conspicuously posted near where the device is stored. The log should include the following information: 1) the manufacturer, model and serial number of the device 2) the operator's name 3) the location where the device was taken and 4) log-out/log-in dates and times. You may use the form provided by RHP to all new licensees, or design your own.

2.5 Notice to Employees

At least one copy of RHP form RHF-12: "Notice to Employees - Standards for Protection Against Radiation" should be posted in an area that is readily accessible and easily seen by all employees who may have contact with the device. This form is also sent to all new licensees. A copy may be obtained by contacting RHP.

2.6 Leak testing

XRF licensees are expected to test their devices for leakage of radioactivity at intervals not to exceed 6 months. Please see page three of your license and/or contact the XRF manufacturer for additional details on how to perform leak tests. Records of these leak tests and their results should be maintained on file at the address listed on the license and kept available for inspection. **Prior to initiating a permanent change of address, the device(s) and their surroundings (e.g. walls or floors in the storage area) should be swiped using leak-test procedures to confirm that no radioactive contamination remains in the area. Please see section 3.4 of this document for further details.**

2.7 Personal dosimetry

Results of personal dosimetry readings for authorized users must be maintained at the address listed on the license. These records should be easily accessible for inspection and kept on file indefinitely for all employees, including those who have left the company.

2.8 Shipping

All shipping and receiving records regarding the XRF should be kept on file at the address listed on the license. These records may be monitored to document proper maintenance and repair of the device in addition to insuring that all relevant U.S. Department of Transportation regulations regarding the shipping of radioactive materials are followed. Contact the shipper and/or the XRF manufacturer for details regarding proper shipping and labeling procedures.

3. ADDITIONAL XRF LICENSEE RESPONSIBILITIES

3.1 Virginia Lead Licensing Program

All individuals who wish to perform residential lead inspections or assessments in Virginia must be licensed as either a Lead Inspector and/or Lead Risk Assessor by the VDPOR. RHP periodically shares information regarding XRF authorized users with the VDPOR. Any known XRF users who still lack this licensure and appear on any radmat license issued by RHP prior to December 1, 1997 risk enforcement action by the VDPOR.

3.2 Inspections

Once issued, all conditions of the license will be subject to periodic compliance inspections by RHP. On average, inspections will be performed once each license period which is every 2 years for XRF licenses issued or renewed after 9/1/97. Approximately 10% of these inspections are unannounced. Any job site where the device is being used is also susceptible to possible inspection. If violations are found, a written Notice of Violation (NOV) will be sent by RHP to the licensee by certified mail. The licensee will then have 30 days after receipt of the NOV to respond with a written plan of correction (POC). RHP will then review and either accept or reject the POC. Once the POC has been accepted, a follow-up inspection may be conducted by RHP to confirm that the violations have been corrected.

3.3 Transfer of a Licensed XRF device to other parties

Individuals/companies may not possess an XRF device containing Co-57 or Cd-109 without a valid radioactive material license. Only after confirming proof of licensure may a vendor legally rent or sell a device to you. It is a violation to transfer an XRF device, even for a short period of time, to an individual or company that does not possess a valid Radioactive Materials License.

This office can only provide license verification for businesses within Virginia. If you wish to transfer the device out-of-state, you must first verify that the individual/business that is to receive the device is properly licensed in that state. Whenever transferring a device out-of-state, RHP recommends that a copy of the receiver's radioactive material license be obtained by the sender and kept on file. Providing that *both* parties are properly licensed in Virginia (or elsewhere), temporary rentals or transfers of a licensee-owned device to another individual, company or branch office are allowed without notifying RHP.

3.4 Change of Address, Termination of License and Permanent Disposal of an XRF Device

If a device owned by the licensee is sold, lost or permanently transferred to another office outside Virginia, RHP must be notified. If the licensee disposes of all XRF devices and has no plans to replace them, the licensee should request that RHP terminate the license.

When permanently disposing of a device/source or moving the device to a new address, a leak test should be performed on the device prior to shipping. If no radioactive devices are to remain in the

area, a “close-out” wipe test of all potential contact surfaces within the XRF storage area should also be conducted. These “close-out” wipe test results must be forwarded to RHP and if the results are acceptable, RHP will formally release the area for unrestricted use. **If you are vacating the premises, this written release should be obtained before a new tenant occupies the area.**

As long as the source(s) in your possession is emitting radiation at greater than background levels, you are obligated to meet all licensee responsibilities. To terminate your license, you must choose one of the following options:

3.4.1 You may sell the XRF device to another party that is properly licensed (whether in Virginia or another state).

You should contact the manufacturer of the device and advertise in trade magazines/newspapers to find possible buyers. If you have a device for sale, write or fax RHP with the device details (Manufacturer, Model, Serial #, Source/Last Resource Date, Age/Condition, etc.) and we will provide a list of XRF devices for sale in Virginia to any potential buyers who express an interest.

3.4.2 You may contract with a private radioactive waste disposal company to properly dispose of the source/device.

Unfortunately, this option is cost-prohibitive for most licensees, as the cost may exceed \$2000.00. RHP can provide you with a list of waste disposal companies if you desire.

3.4.3 You may return the device to the manufacturer to have the radioactive source removed (desourced).

Contact your manufacturer for details, but in most cases, this is cheaper than disposing of the source yourself (usually from \$200-500) and you may still keep the device shell for possible future use or sale. After your device is desourced, leak-testing will no longer be necessary and your license may be terminated. If you wish to retain your license after your devices have been desourced, we will remove you from our inspection list (e.g. “deactivation”) upon receiving source removal documentation. You will still be expected to renew your license every two years and notify us when you wish the license to be reactivated or terminated.

3.4.4 You may continue to possess the device (with source) until it decays to harmless levels.

Although this option may appear to be the cheapest option in the short-term, it necessitates keeping your radmat license active long after the device has been rendered useless by radioactive decay (which usually occurs after only 2 half-lives have elapsed). Before disposing of the device as regular waste, you will be obligated to store it until a survey meter reading of the XRF with its shield in the “open” position shows radioactivity within normal background levels. **Depending on the isotope and the initial activity level, this may require a storage period of 10-20 years.**

If all XRF device sources in your possession have decayed for at least two half-lives and you no

longer wish to use XRFs, you may request license deactivation. When a deactivation request is received, we will inspect the device and your documentation to confirm that the device(s) cannot be used. You must then agree not to acquire another device and to store all deactivated XRFs in such a way that they will not be disturbed. Leak testing will no longer be required unless the device is moved to a new location. You will also be excused from further license inspections, although renewal of the license every two years will still be required. You must notify this office if you wish your license to be reactivated or terminated. **When you consider your long-term time and effort along with the likely implementation of fees in the near future for all radmat licensing services, this option may prove to be more expensive than desourcing.**

3.5 Suspected or known abuse of XRF licensing regulations

If you suspect an individual or company is offering and/or performing XRF services without proper licensing or is improperly selling or renting XRF devices to unqualified users, please inform RHP so that we may investigate.